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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,114	02/04/2004	Harald Bottner	INFMN-018	3951

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EXAMINER	
SANDVIK, BENJAMIN P	

ART UNIT	PAPER NUMBER
2826	

DATE MAILED: 05/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/773,114	BOTTNER ET AL.	
	Examiner	Art Unit	
	Ben P. Sandvik	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-21 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7, 16-18, and 20 rejected under 35 U.S.C. 102(b) as being anticipated by Sudou et al (European Patent #1079445), hereafter known as Sudou.

With respect to **claims 1 and 16**, Sudou teaches a thermoelectric layer (Fig. 9f, the layer comprising 105) on a substrate (Fig. 9f, 101), wherein a thermal expansion coefficient of said at least one thermoelectric layer (Bismuth telluride, Col 3 Ln 50-52) differs greatly from a thermal expansion coefficient of the substrate (silicon dioxide, Col 4 Ln 11), an inherent property of bismuth telluride and silicon dioxide, and wherein said at least one thermoelectric layer is coupled to at least one stress reduction means (Fig. 11a, grooves formed upon removal of mask) for the targeted reduction of lateral mechanical stresses present in the layer.

With respect to **claims 2 and 17**, Sudou teaches a stress reduction means arranged between regions of at least one of a functional structure (Fig. 11a, 103) and a region with a thermoelectric layer (Fig. 11a, 105).

With respect to **claim 3 and 18**, Sudou teaches an antiadhesion layer (Fig. 10a, 108) that reduces the adhesion of material of the layer, and forms a stress reduction means upon its removal.

With respect to **claims 7 and 20**, Sudou teaches a trench arranged as said stress reduction means in at least one region of the substrate (Fig. 11a, trench arranged between adjacent electrode layers 102, 103, 104).

With respect to **claim 8**, Sudou teaches a trench that has a depth of less than 100 μm (Col 10 Ln 6-8), since 100 nm + 5 μm + 200 nm is less than 100 μm.

With respect to **claim 9**, it is an inherent property of bismuth telluride and silicon dioxide that their thermal expansion coefficients differ by at least $3x10^{-6}$ K^{-1}.

With respect to **claim 10**, it is an inherent property of bismuth telluride and silicon dioxide that their thermal expansion coefficients differ by at least $1x10^{-7}$ K^{-1}.

With respect to **claim 11**, Sudou teaches a thermoelectric layer with a thickness in the range of 2 – 100 μm (Col 13 Ln 37).

With respect to **claim 12**, Sudou teaches a thermoelectric layer with a thickness in the range of 20 – 100 μm (Col 13 Ln 37).

With respect to **claim 13**, Sudou teaches a substrate comprising silicon dioxide (Col 4 Ln 10).

With respect to **claim 14**, Sudou teaches a thermoelectric layer that forms a Peltier layer (Fig. 13, n-type material 105 and p-type material 205).

With respect to **claim 15**, Sudou teaches a thermoelectric layer comprising a thermoelectric material including bismuth telluride (Col 3 Ln 49-52).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sudou, in view of Hijzen et al (U.S. PG Pub #20010009800).

With respect to **claim 4**, Sudou teaches all of the limitations of claim 3, but does not teach that the antiadhesion layer comprises at least one of Ti-W alloy and silicon dioxide. Hijzen teaches a mask that comprises silicon dioxide (Fig. 1, 51 and Paragraph 27). It would have been obvious to one of ordinary skill in the art at the time the invention was made to fabricate the mask of Sudou to comprise silicon dioxide as taught by Hijzen in order to facilitate an easier deposition of the mask.

Claims 5, 6, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudou, in view of Goldbach et al (U.S. PG Pub #2002015281).

With respect to **claim 5, 6, and 19** Sudou teaches all of the limitations of claim 1, but does not teach a vertical offset between two laterally adjoining layers arranged as said stress reduction means in at least one region on the substrate. Goldbach teaches that a trench can be partially filled so as to create a vertical offset between the filler and the surrounding substrate (Fig. 1, 7). It would have been obvious to one of ordinary skill in the art at the time the invention was made to fill the space between the prestructured electrode layers on the substrate of Sudou as taught in Goldbach in order to provide an insulation between the electrode layers.

Claim 21 rejected under 35 U.S.C. 103(a) as being unpatentable over Sudou, in view of Amano et al (U.S. Patent #5547598).

With respect to **claim 21**, Sudou teaches a substrate having a first thermal expansion coefficient (Fig. 9f, 101), a thermoelectric layer formed over the substrate (Fig. 9f, the layer comprising 105), the thermoelectric layer having a second thermal expansion coefficient that differs from the first thermal expansion coefficient by at least 10^{-5} K^{-1} (by inherent property as stated above), wherein said at least one thermoelectric layer is divided into a plurality of thermoelectric layer portions (Fig. 9f, 105), each thermoelectric layer portion being separated

from adjacent thermoelectric layer portions by a stress reduction region (Fig. 11a, grooves formed upon removal of mask), and wherein said each thermoelectric layer portion has a thickness in the range of 2 and 100 μm (Col 13 Ln 37), but does not teach a width in the range of 1.4 to 20 mm. Amano teaches a width of in the range of 1.4 to 20 mm (Fig. 3, 2 and 3, and Col 6 Ln 35 referring to the length measurement). It would have been obvious to one of ordinary skill in the art at the time the invention was made to fabricate the thermoelectric elements of Sudou with a width as taught by Amano in order to meet the spatial limitations of the package.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben P. Sandvik whose telephone number is (571) 272-8446. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

bps

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